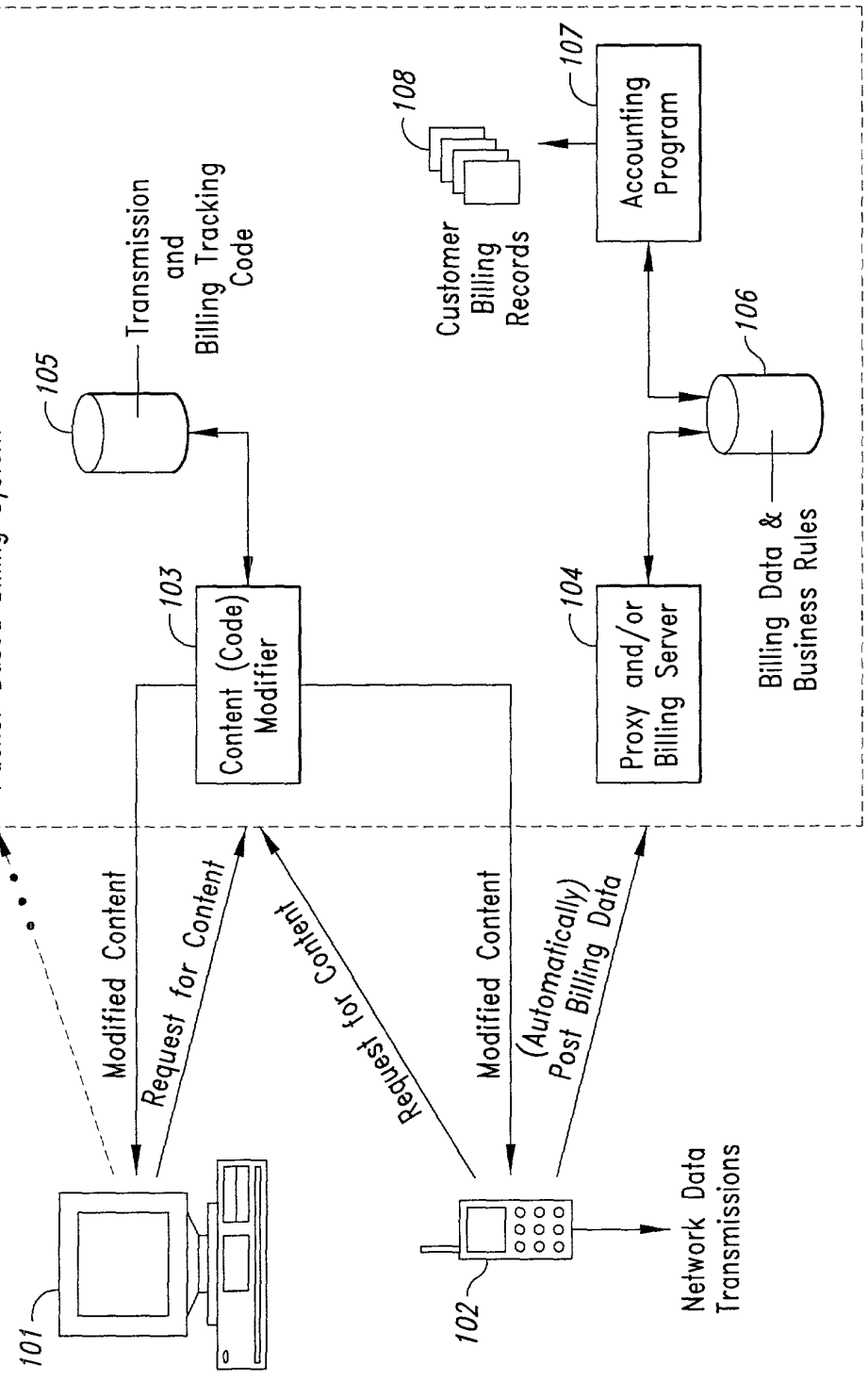
100
Packet-Based Billing System
105
Transmission and Billing Tracking Code
103
Content (Code) Modifier
108
Customer Billing Records
107
Accounting Program
106
104
Proxy and/or Billing Server
Billing Data & Business Rules
Modified Content
Request for Content
Request for Content
Modified Content
(Automatically) Post Billing Data
101
102
Network Data Transmissions

Fig. 1

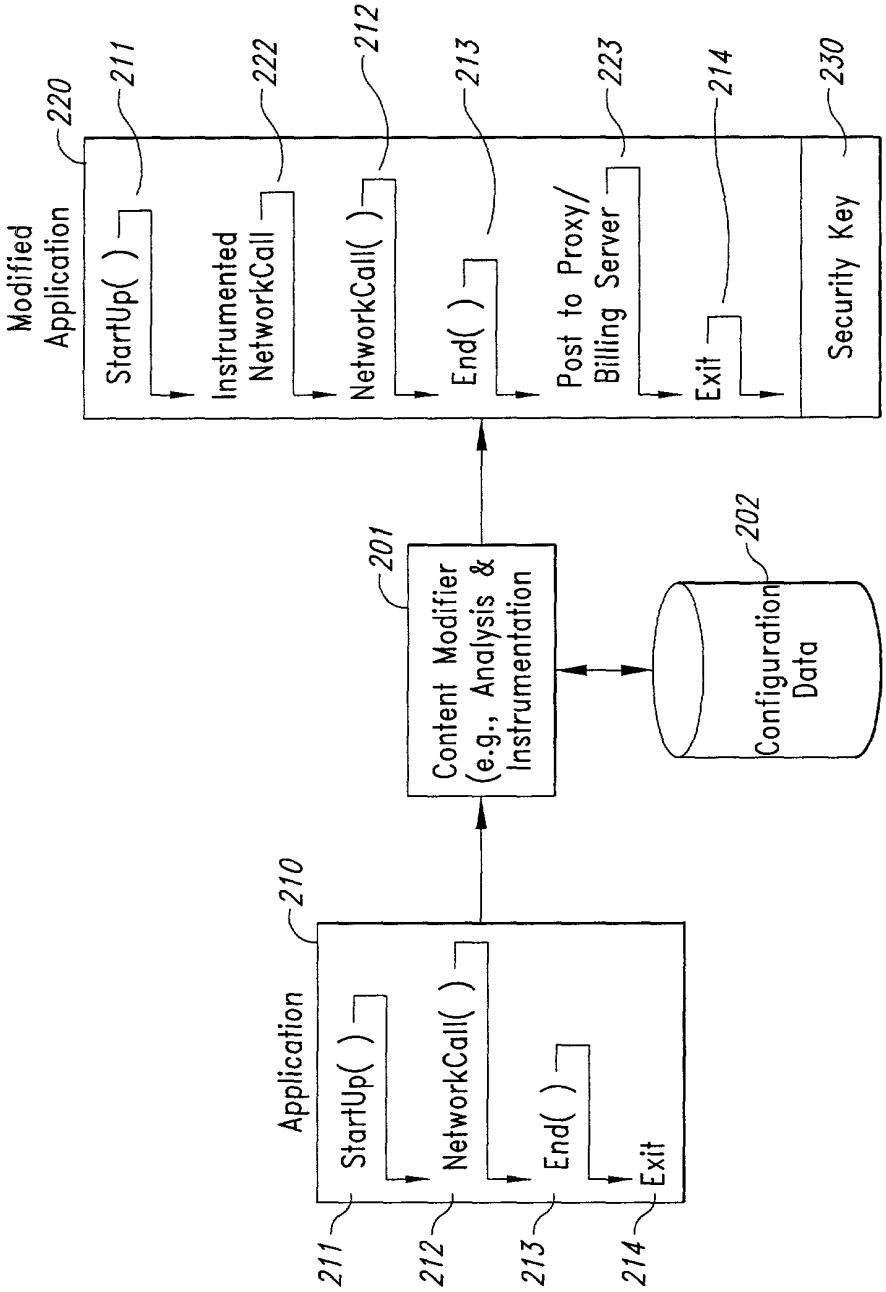
Modified Application
220
StartUp( )
211
Instrumented NetworkCall
222
NetworkCall( )
212
End( )
213
Post to Proxy/ Billing Server
223
Exit
214
Security Key
230
Content Modifier (e.g., Analysis & Instrumentation
201
Configuration Data
202
Application
210
StartUp( )
NetworkCall( )
End( )
Exit
211
212
213
214

Fig. 2

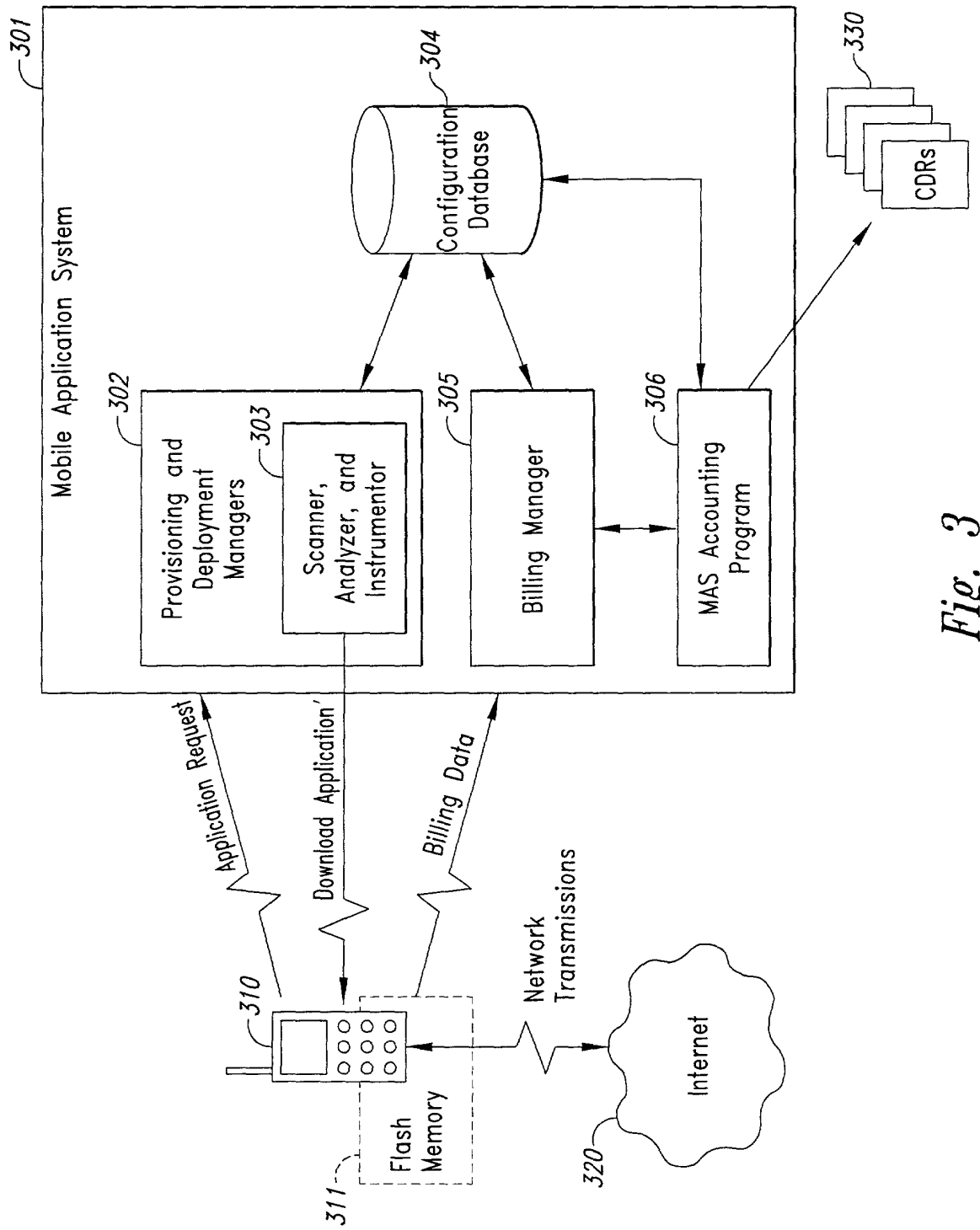
301
Mobile Application System
302
Provisioning and Deployment Managers
303
Scanner, Analyzer, and Instrumentor
304
Configuration Database
305
Billing Manager
306
MAS Accounting Program
330
CDRs
Application Request
Download Application
Billing Data
Network Transmissions
310
Flash Memory
311
Internet
320

Fig. 3

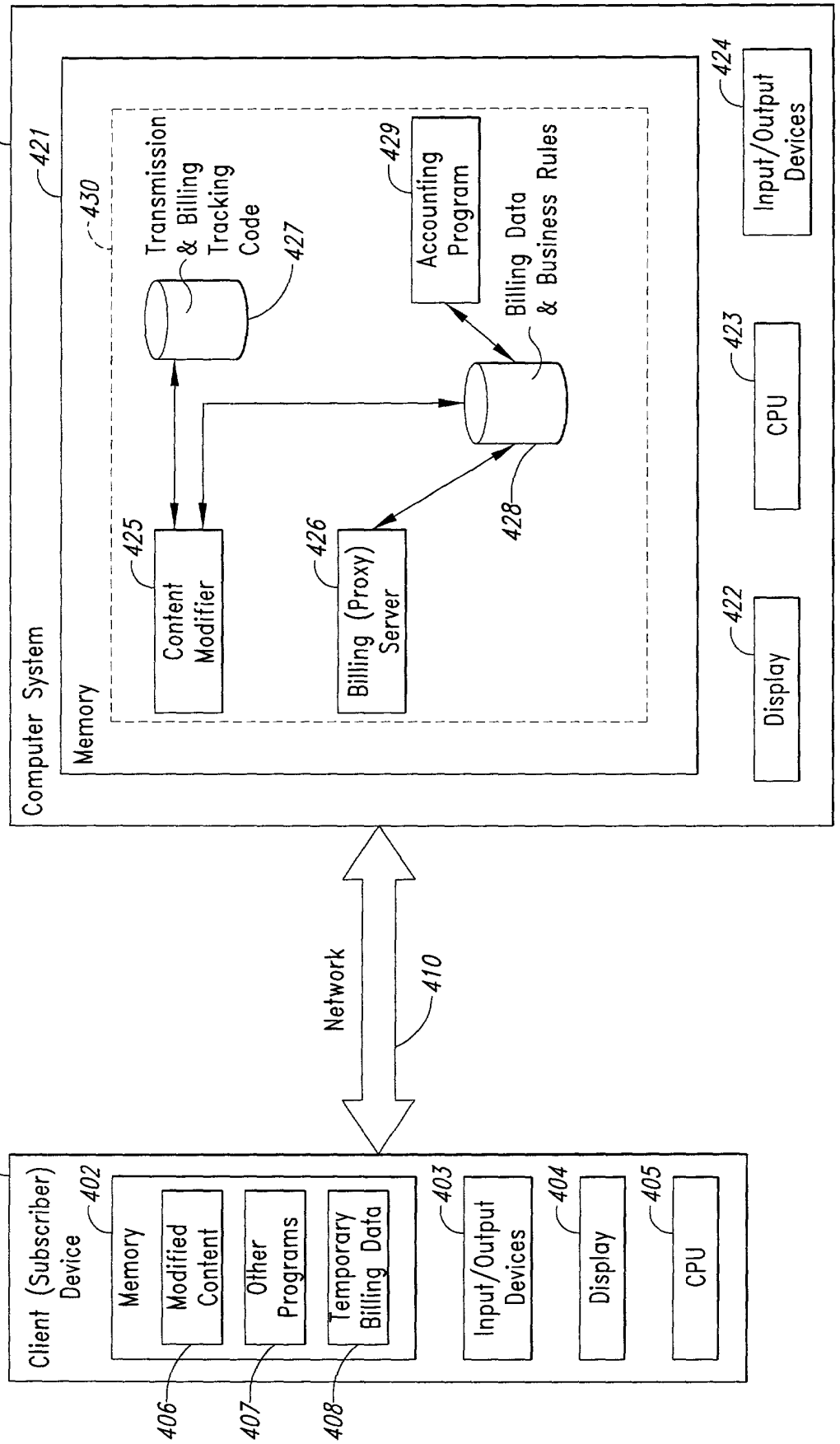
Client (Subscriber) Device
401
Memory
402
Modified Content
406
Other Programs
407
Temporary Billing Data
408
Input/Output Devices
403
Display
404
CPU
405
Network
410
Computer System
420
Memory
421
430
Transmission & Billing Tracking Code
427
Content Modifier
425
Billing (Proxy) Server
426
Billing Data & Business Rules
428
Accounting Program
429
Display
422
CPU
423
Input/Output Devices
424

Fig. 4

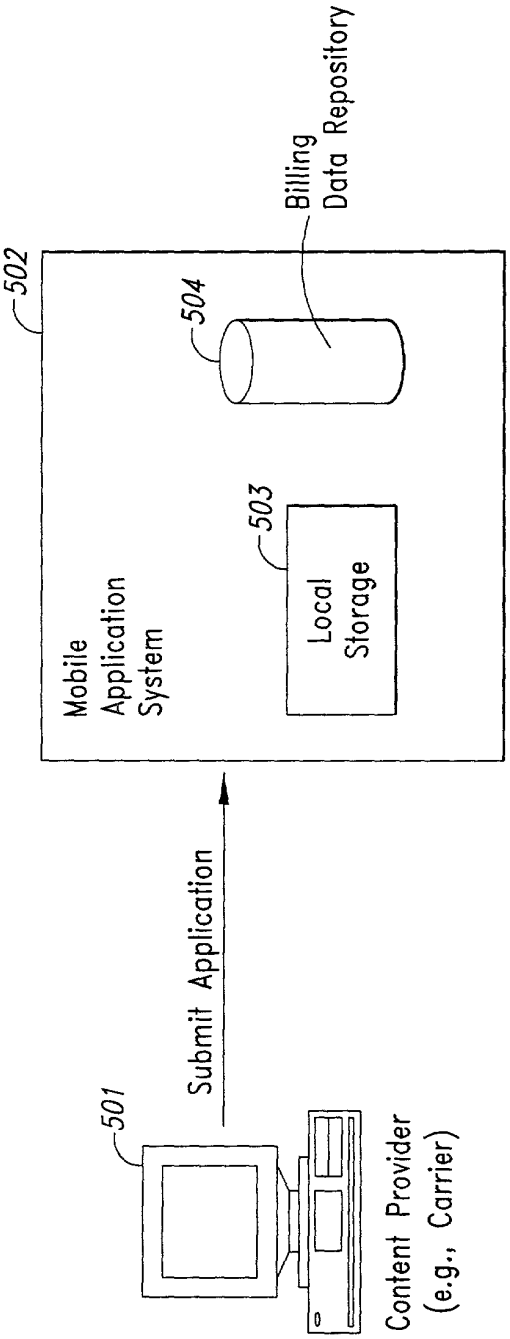
Billing
Data Repository
502
504
503
Local
Storage
Mobile
Application
System
Submit Application
501
Content Provider
(e.g., Carrier)

Fig. 5

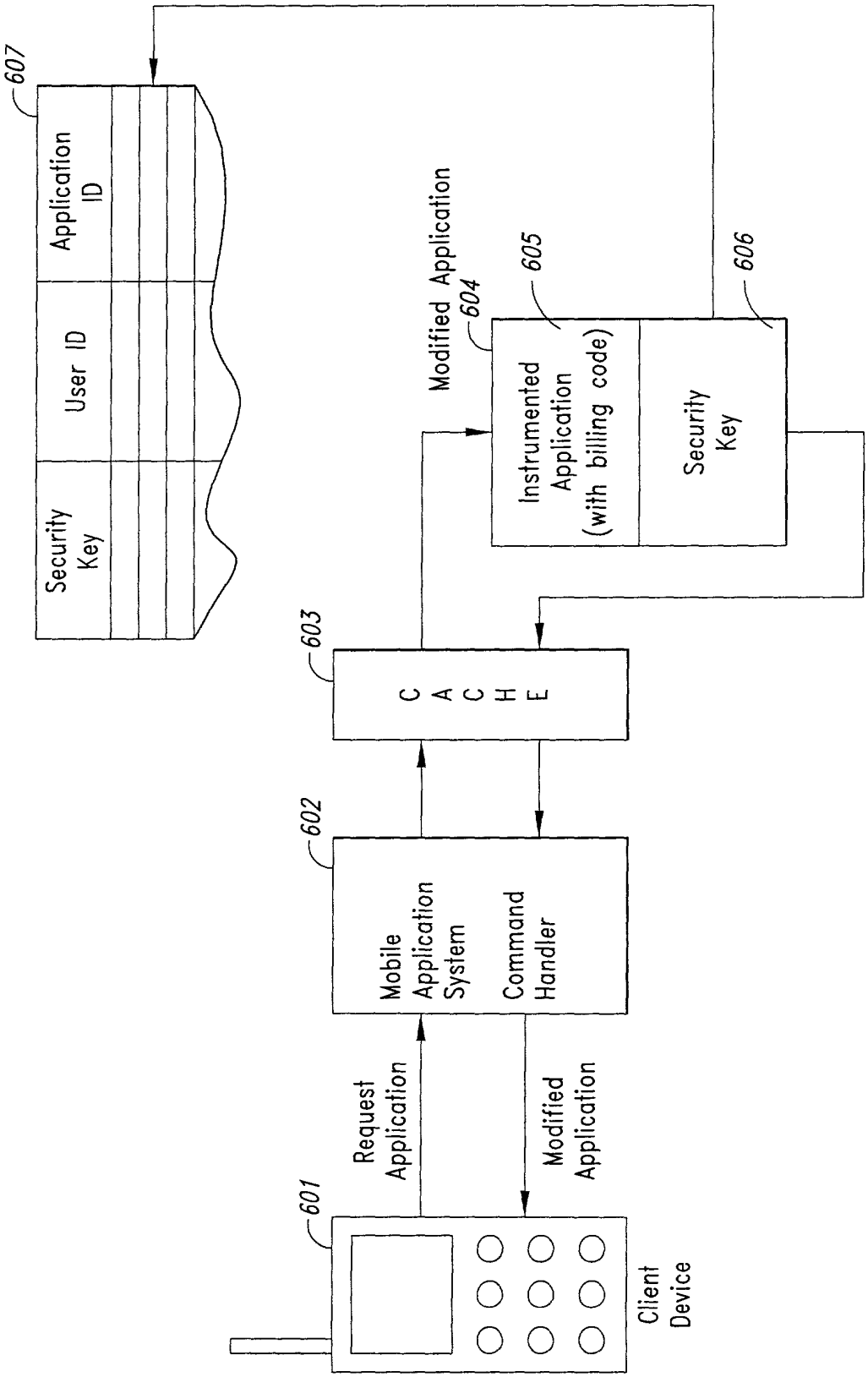
607
Application ID
User ID
Security Key
Modified Application
604
605
606
Instrumented Application (with billing code)
Security Key
603
C A C H E
602
Mobile Application System
Command Handler
Request Application
Modified Application
601
Client Device

Fig. 6

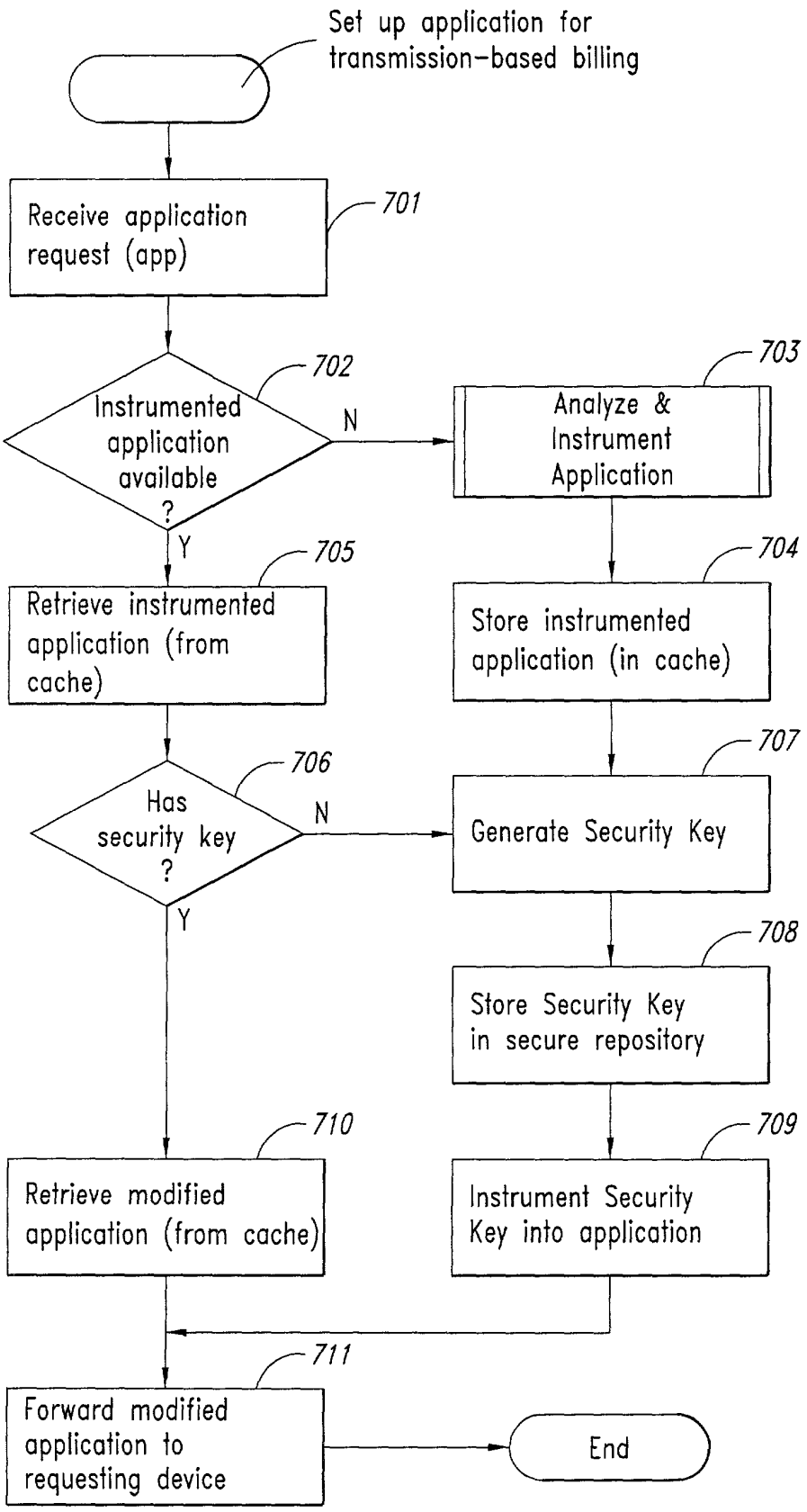
Set up application for transmission-based billing
Receive application request (app)
701
Instrumented application available ?
702
N
Y
Analyze & Instrument Application
703
Retrieve instrumented application (from cache)
705
Store instrumented application (in cache)
704
Has security key ?
706
N
Y
Generate Security Key
707
Store Security Key in secure repository
708
Retrieve modified application (from cache)
710
Instrument Security Key into application
709
Forward modified application to requesting device
711
End

Fig. 7

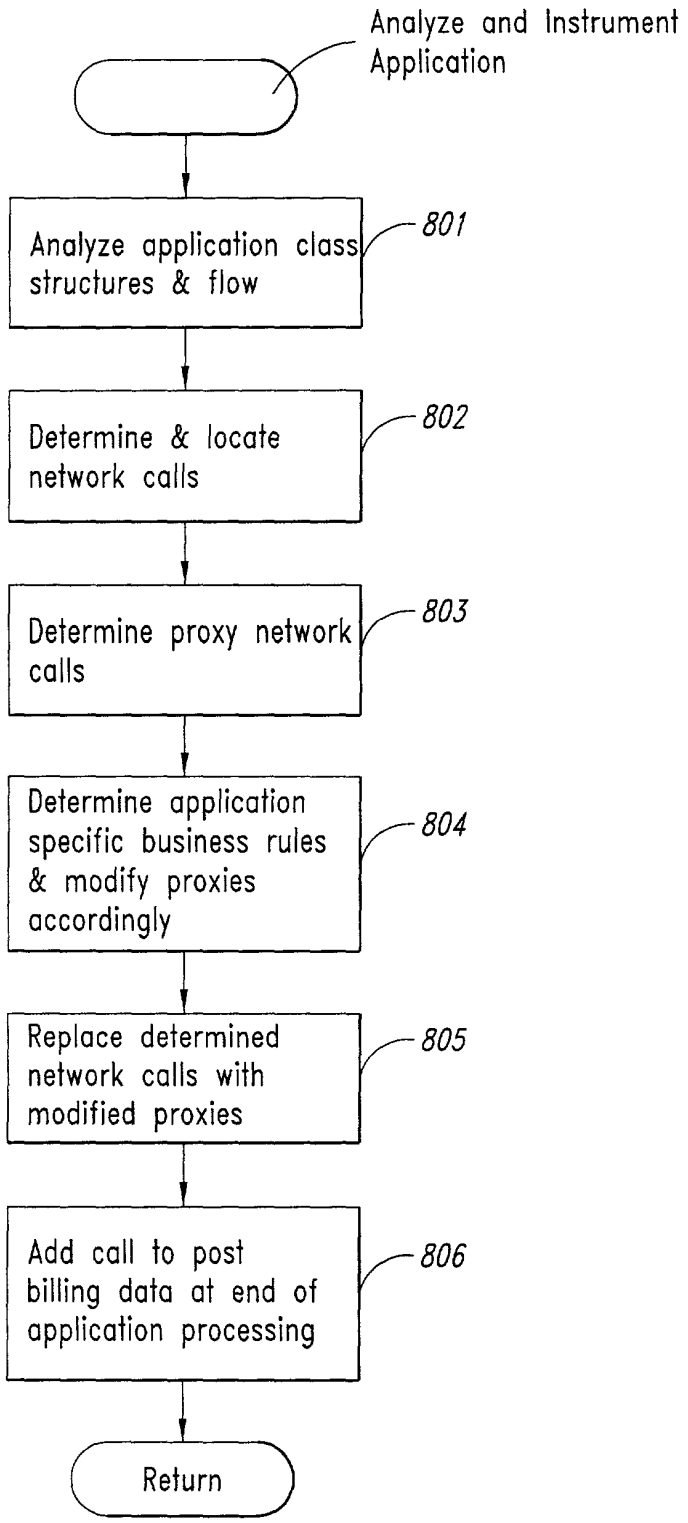
Analyze and Instrument Application
Analyze application class structures & flow
801
Determine & locate network calls
802
Determine proxy network calls
803
Determine application specific business rules & modify proxies accordingly
804
Replace determined network calls with modified proxies
805
Add call to post billing data at end of application processing
806
Return

Fig. 8

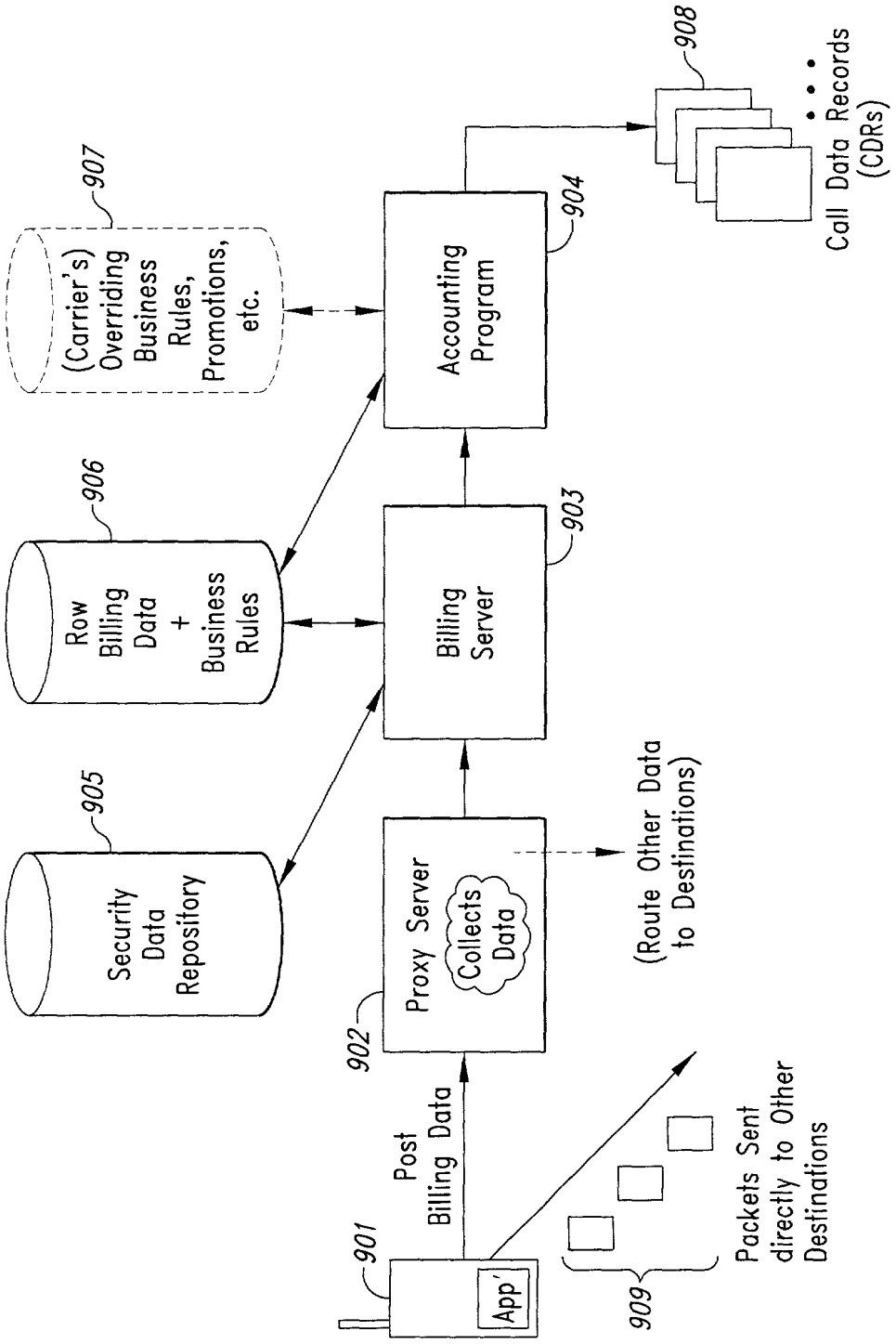
908
Call Data Records (CDRs)
907
(Carrier's) Overriding Business Rules, Promotions, etc.
904
Accounting Program
906
Row Billing Data + Business Rules
903
Billing Server
905
Security Data Repository
902
Proxy Server
Collects Data
(Route Other Data to Destinations)
Post Billing Data
901
App'
909
Packets Sent directly to Other Destinations

Fig. 9

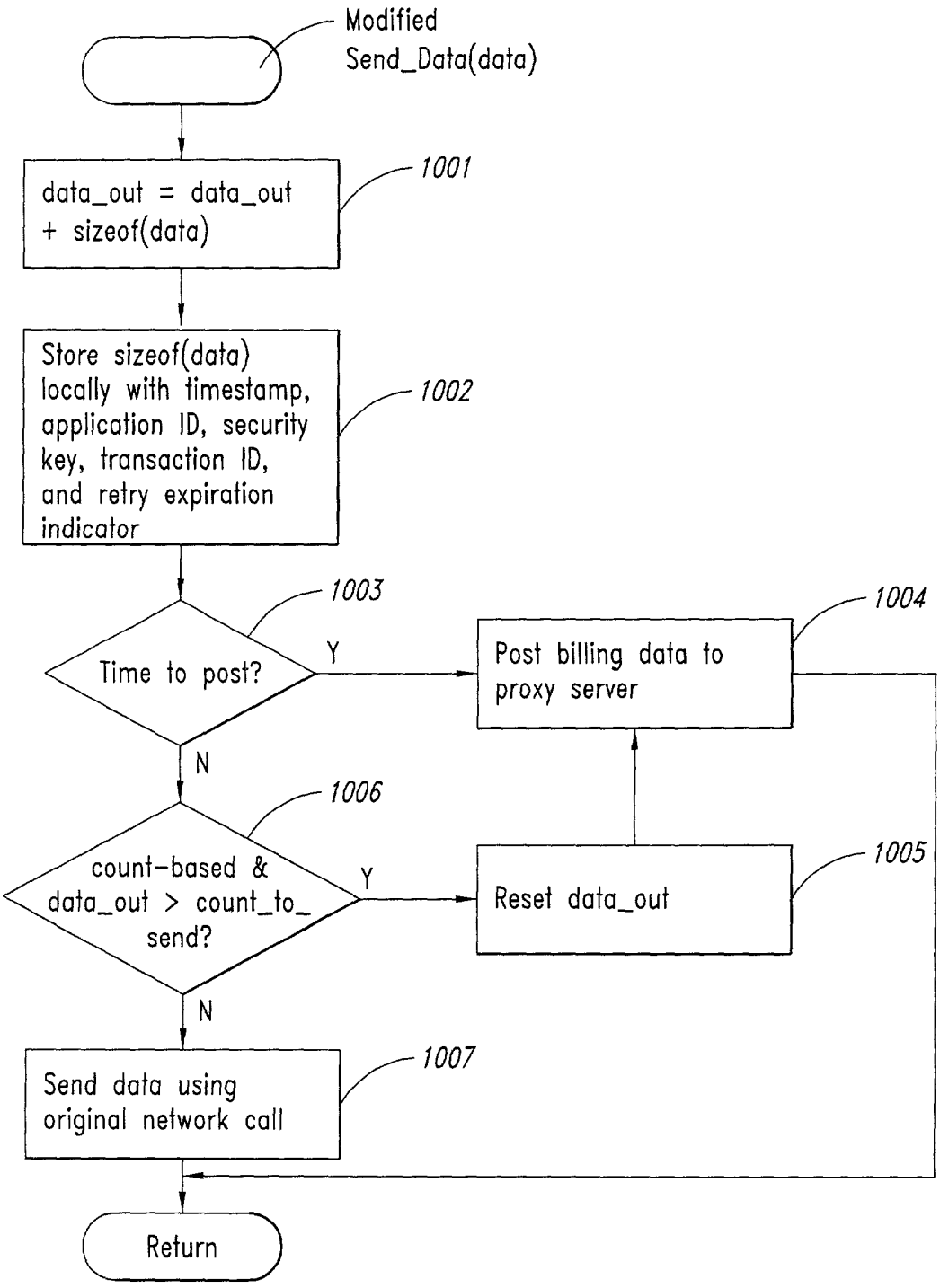
Modified
Send_Data(data)
data_out = data_out + sizeof(data)
1001
Store sizeof(data) locally with timestamp, application ID, security key, transaction ID, and retry expiration indicator
1002
Time to post?
1003
Y
Post billing data to proxy server
1004
N
count-based & data_out > count_to_ send?
1006
Y
Reset data_out
1005
N
Send data using original network call
1007
Return

Fig. 10

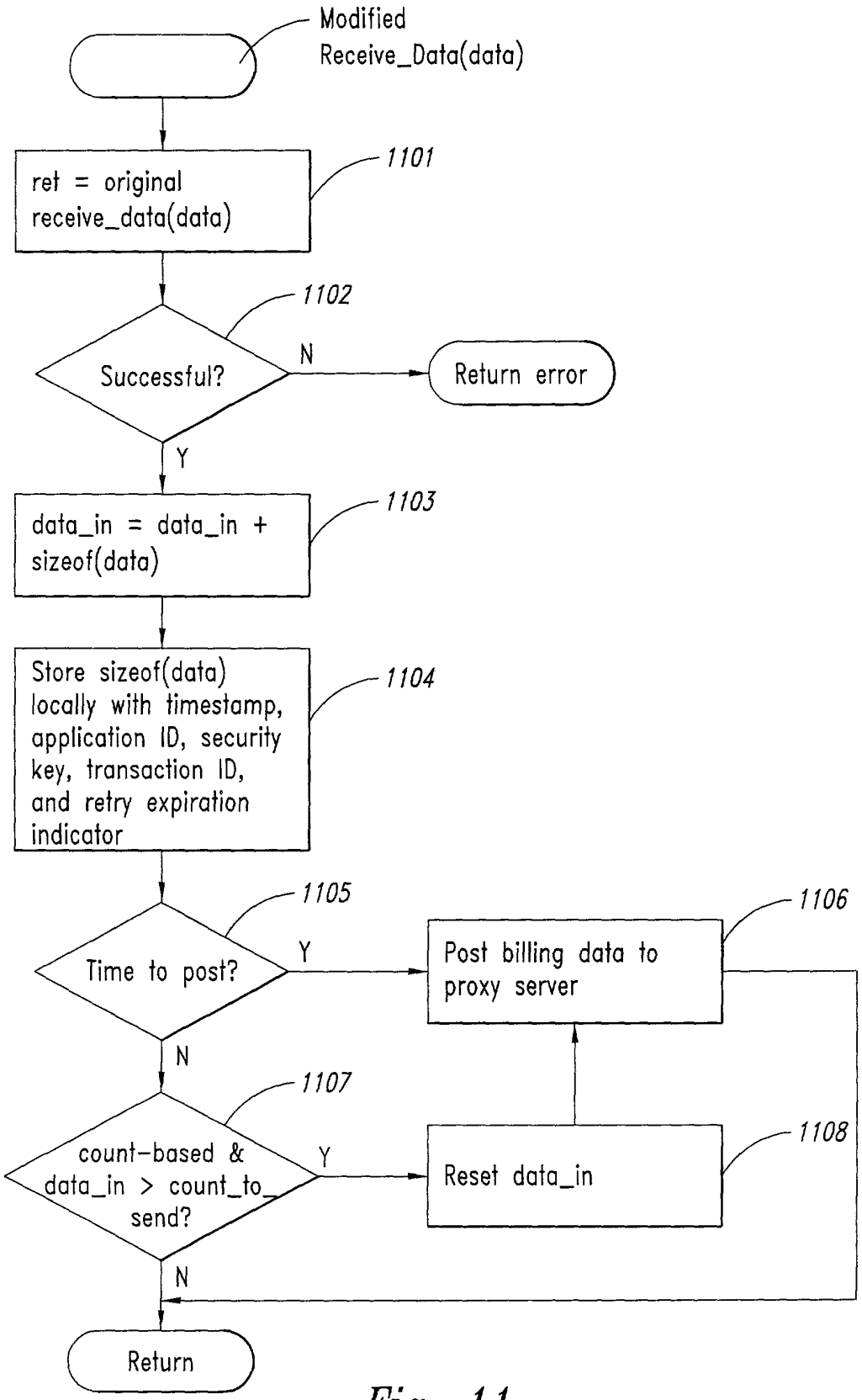
Modified
Receive_Data(data)
ret = original
receive_data(data)
1101
1102
Successful?
N
Return error
Y
data_in = data_in +
sizeof(data)
1103
Store sizeof(data)
locally with timestamp,
application ID, security
key, transaction ID,
and retry expiration
indicator
1104
1105
Time to post?
Y
1106
Post billing data to
proxy server
N
1107
count-based &
data_in > count_to_
send?
Y
Reset data_in
1108
N
Return

Fig. 11

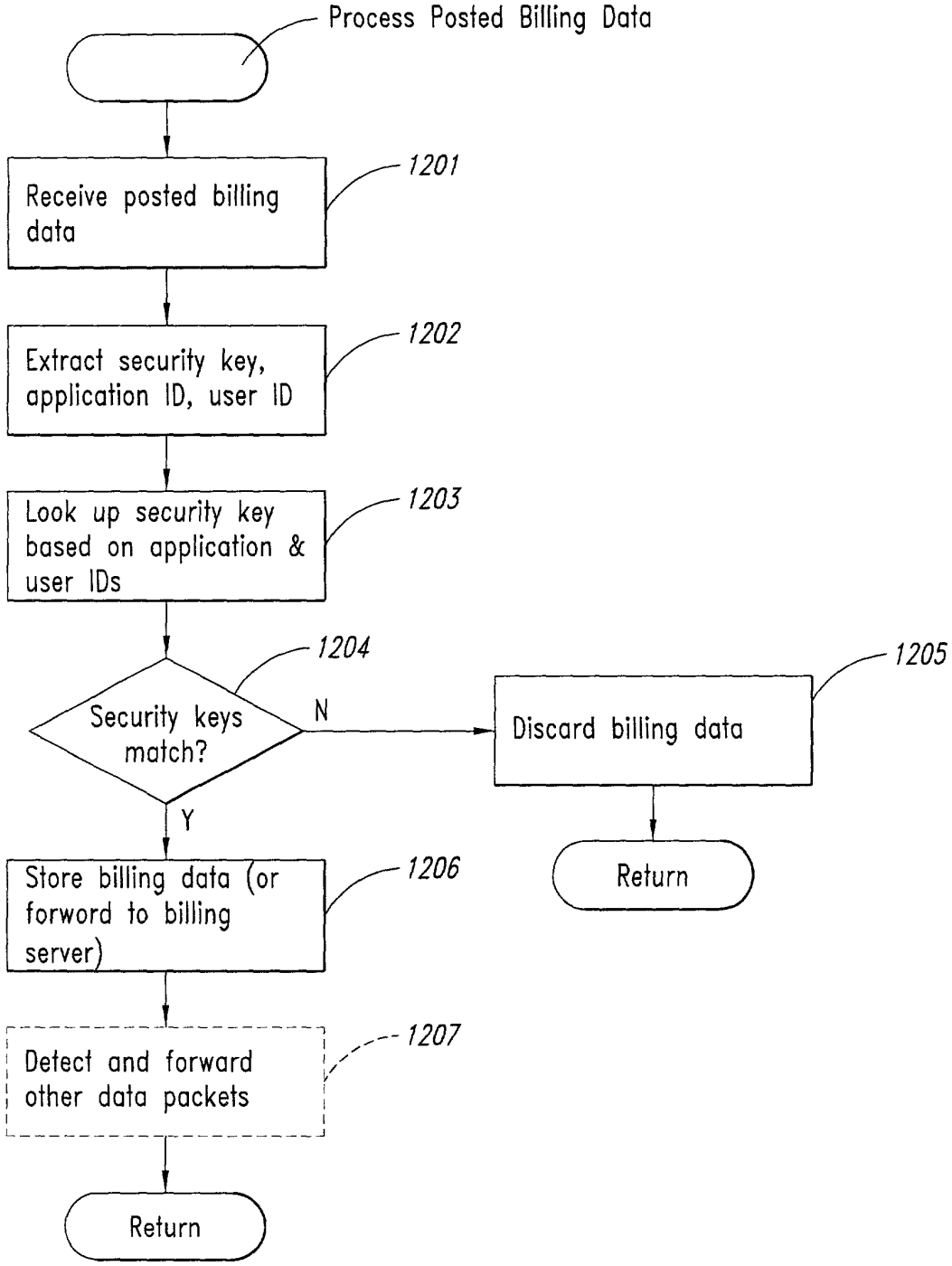
Process Posted Billing Data
Receive posted billing data
1201
Extract security key, application ID, user ID
1202
Look up security key based on application & user IDs
1203
Security keys match?
1204
N
Discard billing data
1205
Return
Y
Store billing data (or forword to billing server)
1206
Detect and forward other data packets
1207
Return

Fig. 12

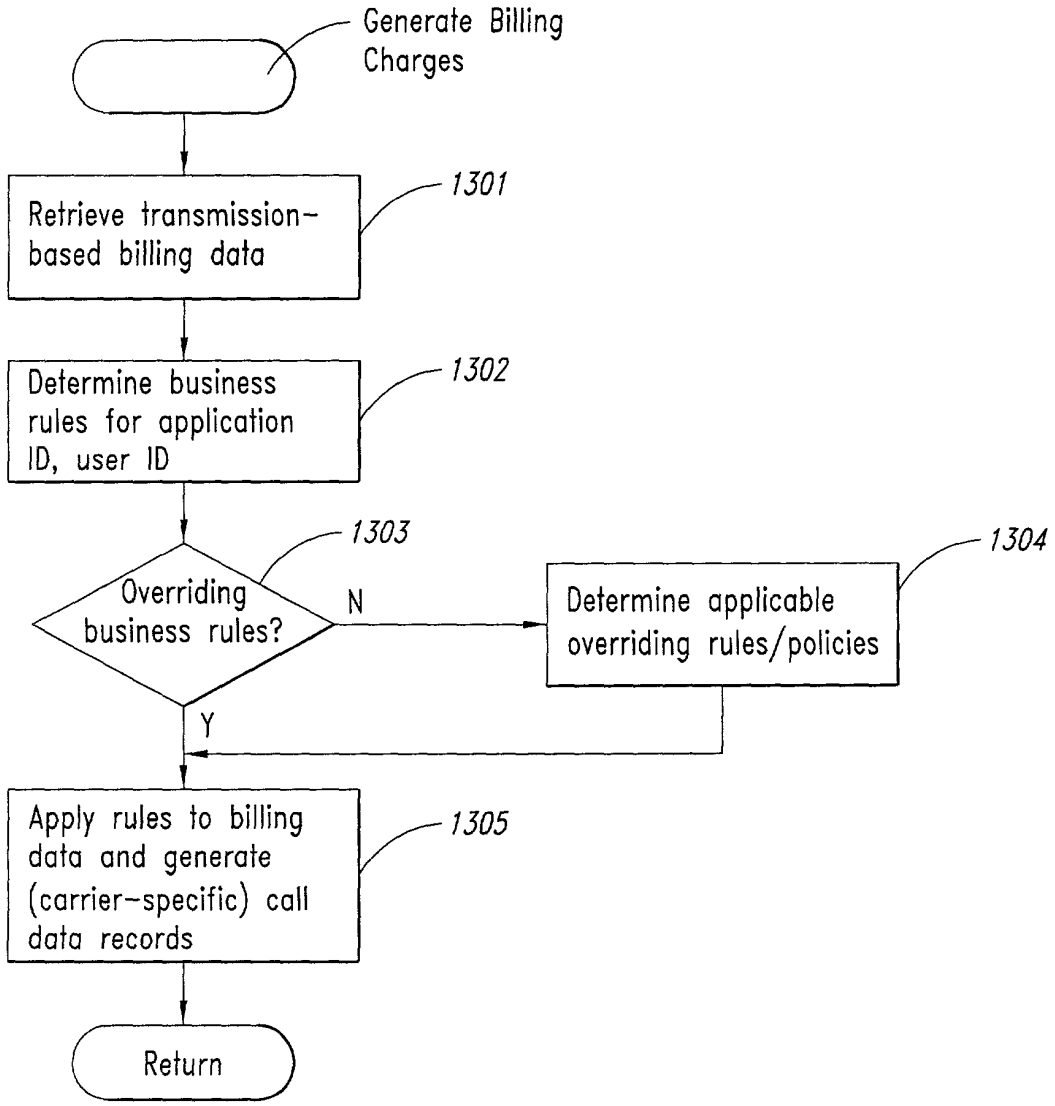
Generate Billing Charges
Retrieve transmission-based billing data
1301
Determine business rules for application ID, user ID
1302
Overriding business rules?
1303
N
Y
Determine applicable overriding rules/policies
1304
Apply rules to billing data and generate (carrier-specific) call data records
1305
Return

Fig. 13